Version 1.0, circa Jan. 6, 2019

PHYSICS 1331

Term 2194 (Spring 2019), class# 22766

- Instructor: Dr.S. (Prof. Vladimir Savinov).
- Office: Allen Hall, 402 (office hours are conducted elsewhere).
- Office hours: time and location will be announced in class, on CourseWeb and via e-mail. Also, I am usually available right after class in Thaw 104 or in the hallway outside. I am rarely, if ever, available right before class, even for quick questions. Office hours are conducted in group environment (unless you are the only student who showed up). I do not do individual tutoring. Show up at the time when office hours start. If you show up late, most likely you will miss some important discussion.
- Phone#: (412) 624-9042 (NOT a good way to get in touch with me).
- e-mail (THE best way to contact me): vps3@pitt.edu
  Note that when an e-mail is sent to me using non-Pitt SMTP servers, it could be lost or get stuck in a filter I have no control over, but I can't do anything about this. Note that I do not check my junk e-mail folder at Pitt, all e-mail stuck there is deleted automatically.
  Alternatively, you can contact me at vladimirsavinov@gmail.com (there will be no third-party interference in this case). Note, however, that I will be communicating with class using students' e-mail address in **pitt.edu** domain. It is your responsibility to make sure you read e-mail sent to you at **pitt.edu** regularly and none of the information is lost. All e-mails sent to class will also be posted/archived on CourseWeb.
  To conclude: if you are using Pitt's SMTP, send your e-mails to vps3@pitt.edu, if you are using some other SMTP server, send your e-mails to vladimirsavinov@gmail.com. Don't worry, all messages will end up in the same place (and will be read (by me)).
- Lectures: MWF 1:00pm-1:50pm, Thaw 104.
- Textbook: *Classical Mechanics* by John R. Taylor, University Science Books, 2005.

Course Description

Classical (non-relativistic) Mechanics is one of the earliest and well-established disciplines in Physics. Various aspects of Mechanics, such as, *e.g.* chaos, non-linear phenomena, numerous applications to Engineering and such remain to be active areas of research. In this class we will study deterministic behavior of single particles and rigid bodies. We will start with Newtonian formulation of Mechanics and advance to Lagrangian and Hamiltonian dynamics later in the term. Most generally, the objectives include 1) to provide the students with a strong background in the techniques and methods of Classical

Mechanics at intermediate level, 2) to introduce the mathematical and computational methods for solving differential equations and 3) to prepare the students to be able to tackle more advanced classes. The lectures will closely follow the textbook (with additional material introduced in class, as needed), and most, but not necessarily all, of the homework problems will be from the text or based on it. In addition, there may also be assignments from outside the book on relevant material. It would be a very good idea to have a (very) regular access to the textbook. I requested a copy of the textbook to be placed on reserve at Bevier Engineering Library in Benedum Hall. You can buy a copy of the textbook from Pitt's bookstore. Textbook information can be found at publisher's web site or/and at amazon.com and many other sources Textbook's ISBN-13: 978-1-891389-22-1, ISBN-10: 1-891389-22-X. I will cover most of material from chapters 1 through 11 and 13. Knowledge of introductory physics (at Phys174 level), calculus, vector algebra and differential equations is assumed and expected. Please keep in mind that these are prerequisites for this class. You will have to read the textbook before class and after class and do a sizeable body of independent work outside of class. You will be responsible for all material from chapters (partially or fully) discussed in class.

Attendance

Attendance is expected but is not mandatory, though I expect every student to attend every single class. Students are most strongly advised to take lecture notes during class and to study their notes later in the week. If you can't reproduce the calculations presented in class or/and in the book, this would be a clear sign of having trouble with class material. If you miss a class, it is your responsibility to catch up by studying the textbook, by asking other students to share their notes with you and by attending office hours to ask questions about assigned problems and to clarify material in the textbook and/or presented in class. I will not be holding individual sessions with students who missed a class – if you couldn't make it, read the book. I do not provide lecture notes.

Courseweb

Up to date information about class, including assignments and complementary materials, will be regularly posted on Courseweb (a.k.a. Blackboard). You can access Courseweb at http://courseweb.pitt.edu (use your Pitt network computer account and password to log in). CourseWeb information will be updated regularly (almost daily).

Homework Assignments

Homework will be assigned (announced electronically on Courseweb) regularly. You are strongly encouraged to discuss the homework problems with each other (copying other people's work or from online sources is, of course, strictly forbidden). When you turn in your assignment, show all your work. Do not skip intermediate steps. Do not try to save paper. Your pictures/plots/sketches should be large size. Do not turn in your scratch paper. Be neat. Do not e-mail your work to me (unless I request this). Make it easy for whoever grades your work to figure out what you have done. Show ALL steps, do NOT assume that some of the steps are "obvious" or "trivial". Copying from any solution manual will have most severe consequences associated with this. Recently, there have been instances of students expelled for such violations of academic integrity. Attend office hours. Take notes in class. The solutions to the homework problems will be posted on Courseweb. Before you ask questions of the type "what's wrong with (every single step) of my solution?", study the solutions, understand how to do the problem, do

it from scratch and, if you are unable to solve the problem after that, come to office hours / ask me to help, so I can explain the (posted) solution to you. I do not normally explain what's wrong with individual wrong solutions, rather, I explain how the problem should (or could) be solved.

Grading Scheme and Other Details

There will be two midterm exams and one comprehensive (*i.e.*, cumulative) final exam. Midterms dates will be announced at a later time, but no later than two weeks before the actual exam. The final exam date is set by the university (see `https://www.registrar.pitt.edu/assets/pdf/2194_EXAMS.pdf`), and it is currently scheduled on Monday, Apr. 22, between 4:00pm and 5:50pm. The location of final exam will be announced at a later time. You should be aware of the University Final Exam Conflict Accommodation Procedure outlined at `https://www.registrar.pitt.edu/assets/pdf/2194_EXAMS.pdf`. The final grade will be determined by your homework (∼10%), mid-term exams (∼25% each), and final exam (∼40%). If you have any questions / need anything clarified, please contact me at vps3@pitt.edu.

Note that, to solve some of the problems / work on various projects assigned in class you may need a student license for **Mathematica** software. Please contact Pitt's Software Licensing Service as soon as possible to get your free copy of **Mathematica**. If you want to use some other software / tools (*e.g.* python), it's OK with me, but it is your responsibility and liability to get everything done as requested in a project. More information can be found on Pitt's web. Note that **Mathematica** is also available at Pitt's computer labs.

Supplementary References

I requested to place several additional textbooks for you on reserve at Bevier Engineering Library in Benedum Hall. These books are not required for this class, but may come in handy. These books include

- *Analytical Mechanics* by G.R. Fowles and G.L. Cassiday, Pitt library call number **QA807.F65, 1993**, this is another excellent undergraduate-level textbook.
- *Introduction to Classical Mechanics* by D. Morin, Pitt library call number **QA805.M822 2008**, yet another excellent undergraduate-level textbook.
- *Classical Dynamics of Particles and Systems* (any edition) by J.B. Marion and S.T. Thornton, Pitt library call number **QA845.M38, 1995**, an advanced undergraduate book used by many Pitt professors in the past, more of a reference book than a textbook.
- *Classical Mechanics: Point Particles and Relativity* by W. Greiner, Pitt library call number **QC125.2.G7413, 2004**, the first part of a two-volume introduction to undergraduate-level Mechanics used in some parts of Europe.
- *Classical Mechanics: Systems of Particles and Hamiltonian Dynamics* by W. Greiner, Pitt library call number **QA805.G675, 2003**, the second part of a two-volume introduction to undergraduate-level Mechanics used in some parts of Europe.
- *Classical Mechanics* (any edition) by H. Goldstein, Pitt library call number **QA805.G624, 1980**, one of the standard graduate-level book

- *Mechanics* by L.D. Landau and E.M. Lifshitz, Pitt library call number **QA805.L283, 1989**, a very advanced hard-core undergraduate-level book.
- *Mathematical Methods of Classical Mechanics* by V.I. Arnold, Pitt library call number **QA805.A6813, 1989b**, a very advanced graduate-level book that will blow your mind.

Special and/or Unexpected Circumstances and Emergencies: Should such arise, please follow the following protocol: first take care of your emergency and/or unexpected circumstances and then, when you have time, send an e-mail to your teacher outlining your circumstances and the nature of your emergency. All such events will be handled on case by case basis. Generally, do not rely on an oral communication with your teacher, any request / explanation of some situation / any commitment must be communicated electronically. Generally, no "I" or "G" grades will be assigned in this class. All work for this course should be completed before the end of this term.

Religious Observances and Class Activities: In case your religious observances conflict with class activities / tests / homework assignments due dates and such, please alert your teacher to such possible conflicts as soon as possible and in advance.

Special Accommodations for Disability: If you have a disability that requires special testing or other accommodations, you should notify both the instructor and the Office of Disability Resources and Services (DRS) as early as possible in the term. You may be asked to provide documentation of your disability to determine the appropriateness of accommodations. The Office of Disability Resources and Services is located in the William Pitt Union, Room 140. If needed, please call (412) 648-7890 (voice) to schedule an appointment with them. A comprehensive description of the services provided by DRS office can be obtained on their web site.

Academic Integrity: All students (and the instructor) in this course are expected to follow the University of Pittsburgh academic integrity guidelines. If you are not aware of the specifics, you should obtain a copy of these guidelines from the Dietrich School of Arts and Sciences Dean's Office, 140 Thackeray Hall, or look them up online at their web site. Violations of these guidelines by a student may result in a zero score for an examination/homework/other or/and a failing grade for the entire course.